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Films en polymère

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Description

[0001] This invention concerns polymeric films, in particular, but not exclusively, in the form of synthetic paper.

[0002] It has been proposed hitherto to prepare synthetic paper from polyolefins, especially polypropylene, for example by including a filler in the polymer which is oriented to produce a film having voids in its interior and surface roughness which provides a writeable surface.

[0003] However, the large amounts of filler required to produce a writeable surface adversely affect the physical properties of the film itself. Thus such films have poor stiffness combined with low tensile strength if opacity and more particularly writeability are increased by the addition of more filler.

[0004] EP0220619-A describes opaque multilayer films with printable surfaces which do not require the use of corona discharge treatment to achieve printability. Such films consist of a core layer of propylene homopolymer containing microvoids and at least one outer printable layer which has not been corona discharge treated, the printable layer being of a copolyester condensate of terephthalic acid or isophthalic acid with ethylene glycol or butane diol. As a result of the inherent printability of such films without corona discharge treatment, the deterioration of polyolefin films resulting from such treatments to render them printable is avoided, for example in end uses where the film comes into contact with the packaged goods.

[0005] FR2093986-A describes synthetic papers made from polyolefins containing particulate fillers to provide a paper-like surface to the films. These synthetic papers have an outer surface which includes microvoids which result from the biaxial drawing of layers of polyolefins containing filler particles which induce the formation of microvoids.

[0006] FR2081939-A describes synthetic papers having fine surface irregularities in the form of fine fibrillation which results from the presence of voids caused by stretching films having outer surfaces consisting of blends of polypropylene and certain ethylene-propylene copolymers with organic fillers.

[0007] According to the present invention there is provided an oriented polymeric film comprising a base layer of polypropylene containing micro-voids and having a writeable layer thereon, the writeable layer comprising a blend of a polyethylene having a melt flow index of not more than 1g/10 mins under ASTM D1238/73 (condition L) and at least one chemically incompatible polymer containing units derived from at least one of ethylene, propylene and 1-butene and which is other than an ethylene homopolymer, said incompatible polymer having a melt flow index of from 4 to 50g/10 mins under ASTM D1238/73 (condition L).

[0008] Films of the present invention surprisingly not only have a writeable surface combined with particularly good opacity but they have shown good stiffness and tensile strength when compared with films having a filler

throughout the thickness of the film or high levels of core filler. Furthermore, such films of the present invention are of especial value as packaging films, particularly as layers of the blend are in general heat sealable to themselves.

[0009] The unique decorative appearance of films of the present invention can also be modified by metallising the layer of the blend of polymers. This can have the effect of producing, for example, an anodised appearance.

[0010] If printing is applied to the layer of the blend of polymers, a unique, intensely matt surface can be achieved.

[0011] The films of the present invention have a rough surface provided by a blend of chemically incompatible polymers, and this is achieved without the use of a filler in the writeable layer.

[0012] Chemical incompatibility can be provided in the blends by the use of a polymer containing units derived from at least one of ethylene, propylene and 1-butene provided that the polymer is incompatible, i.e. it should not be a polyethylene homopolymer or a polymer which includes sufficient ethylene based units to impart compatibility. Examples of suitable polymers which are incompatible with polyethylene include polypropylene, co-polymers of propylene or 1-butene with ethylene, and terpolymers of propylene with ethylene and 1-butene.

[0013] The blends should contain a polyethylene with a melt flow index of not more than 1g/10 mins under ASTM D1238/73 (condition L), and preferably this polymer should not flow under these conditions, for example polyethylene having a density of from 0.920g/cm³ to 0.970g/cm³, and preferably about 0.936g/cm³.

[0014] The melt flow index of the incompatible polymer in the blend should be from 4 to 50g/10 min, and it is preferably from 6 to 15, and advantageously about 8g/10 mins, under ASTM D1238/73 (condition L). The density of the incompatible polymer is preferably not less than 0.900g/cm³.

[0015] The blend used to form the writeable layer will usually contain from 25 to 75 weight percent of the first polymer having a melt flow index of not more than 1g/10 mins under the specified conditions.

[0016] Although the present invention provides films having a writeable surface without the use of a filler in the writeable layer, in particular writeability with a ball-point pen or felt-tip pen, pencil writeability can be improved by the inclusion of a small amount of filler particles. Good pencil writeability can be obtained by the inclusion of up to 5 weight percent of organic or inorganic filler particles, based on the weight of the writeable layer. An example of inorganic filler particles which can be used is finely divided silica. In order to enhance writeability, the particle size of the filler particles is preferably greater than the thickness of the writeable layer.

[0017] The base layer is of oriented polypropylene containing micro-voids. Voiding can be effected in

known manner by orienting polypropylene containing an organic or inorganic voiding agent, for example chalk particles, of a particle size, e.g. of 1 to 10 micrometers. Typically the amount of voiding agent present will be from 1 to 30 percent by weight of the base layer.

[0018] The thickness of the base layer can be selected as desired for the particular end use of the film. Examples of suitable thicknesses are from 15 to 55 micrometers, e.g. about 37 micrometers thick. The writeable layer is preferably from 0.5 to 10 micrometers thick, more particularly from 1 to 5 micrometers thick, and advantageously from 2 to 4 micrometers thick. When filler particles are included in the writeable layer, they are preferably up to 10 micrometers in diameter.

[0019] Writeability with ball-point pen can be improved by surface treatment, for example corona discharge.

[0020] Films of the present invention can be used as a packaging film. The films can include a third polymer layer on the base layer. This further layer can be selected for example to promote acceptance of an adhesive layer, e.g. for label stock or cold seal acceptance for packaging use, or to impart printability and/or heat sealability to the surface of the film opposite the writeable layer. Examples of suitable third layers include polymers containing units derived from at least two of ethylene, propylene, 1-butene, an acrylic ester, acrylic acid and maleic anhydride. Typically the third layer will be from 0.6 to 2 micrometers thick. The third layer can be corona discharge treated to aid adhesion of a subsequently applied adhesive layer. However, if a third layer is not used, it will generally be necessary to provide a primer layer if an adhesive layer is to be used.

[0021] Films of the present invention can be produced in known manner by orienting a film consisting of a polypropylene base layer and a layer of the blend thereon. Advantageously this is effected by coextruding these layers to form a composite film which is thereafter stretched in the machine direction, for example from 4.5 to 7:1, advantageously 5:1, and thence in the transverse direction, for example from 9 to 10:1.

[0022] When a third polymeric layer is used, it can be formed by coextrusion of a three layer composite film which is thereafter biaxially oriented, for example under the above stretching conditions.

[0023] Films of the present invention can, when provided with a third polymeric layer, be subjected to further treatment steps, for example they can be metallised in known manner, or they can be provided with printed indicia. Films which have been treated in such a manner can be used as packaging materials.

[0024] The following Example is given by way of illustration only. All parts are by weight unless stated otherwise, and all melt flow index values are measured under ASTM D1238/73 (condition L).

Example

[0025] A three-layer film web was produced by coex-

truding a base layer of polypropylene homopolymer containing 6% calcium carbonate with an average particle size of 3 micrometers with on one face a dispersion of 2.5% silica of 10 micrometers average particle size, 47.5% of polyethylene having a melt flow index of 0.12g/10 mins and 50% of a copolymer of ethylene and propylene having a melt flow index of 8g/10 mins containing about 4% of units derived from ethylene, and on the other face a layer of the above ethylene/propylene copolymer. The web was cooled on a chill roll and thereafter stretched 4.5:1 in the machine direction and subsequently 10:1 in the transverse direction, corona discharge treated and wound up.

[0026] The resultant film had a total thickness of 43 micrometers, with the layer of blend being about 2 micrometers thick and the layer on the opposite face being 1.5 micrometers thick. The overall density of the film was 0.690 g/cm³.

[0027] The surface containing the silica showed good ball-point pen and pencil writeability, with a high degree of mattness giving a quality paper feel to the film.

[0028] The surface containing the silica was printed after which it had an intensely matt appearance.

Claims

1. An oriented polymeric film comprising a base layer of polypropylene containing micro-voids and having a writeable layer thereon, the writeable layer comprising a blend of a polyethylene having a melt flow index of not more than 1g/10 mins under ASTM D1238/73 (condition L) and at least one chemically incompatible polymer containing units derived from at least one of ethylene, propylene and 1-butene and which is other than an ethylene homopolymer, said incompatible polymer having a melt flow index of from 4 to 50g/10 mins under ASTM D1238/73 (condition L).
2. A film according to claim 1, wherein the polyethylene has a density of from 0.920g/cm³ to 0.970g/cm³.
3. A film according to any of the preceding claims, wherein the chemically incompatible polymer has a melt flow index of from 6 to 15g/10 mins under ASTM D1238/73 (condition L).
4. A film according to any of the preceding claims, wherein the blend comprises 25 to 75 weight percent of the first polymer based on the total weight of the blend.
5. A film according to any of the preceding claims, wherein the writeable layer includes up to 5 weight percent of organic or inorganic filler particles dispersed therein based on the weight of the layer.

6. A film according to any of the preceding claims, having a third polymeric layer on the base layer.
7. A film according to any of the preceding claims, having an adhesive layer or cold seal on the base layer or on the third polymeric layer when present.
8. A film according to any of the preceding claims, in the form of a packaging film.
9. A film according to any of the preceding claims, in the form of a synthetic paper.

Patentansprüche

1. Ausgerichtete Polymerfolie mit einer Grundsicht aus Polypropylen, die Mikro-Vakuolen enthält und eine auf ihr befindliche, beschreibbare Schicht besitzt, die eine Mischung aus Polyethylen mit einem Schmelzflußindex von nicht mehr als 1 g/10 min gemäß ASTM D1238/73 (Bedingung L) und wenigstens einem chemisch inkompatiblen Polymer aufweist, das von wenigstens einem der Stoffe Ethylen, Propylen und 1-Buten abgeleitete Einheiten besitzt und ein anderes Polymer als Ethylen-Homopolymer ist, wobei das inkompatible Polymer einen Schmelzflußindex von 4 bis 50 g/10 min gemäß ASTM D 1238/73 (Bedingung L) hat.
2. Folie nach Anspruch 1, **dadurch gekennzeichnet**, daß das Polyethylen eine Dichte von 0,92 g/cm³ bis 0,97 g/cm³ besitzt.
3. Folie nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß das chemisch inkompatible Polymer einen Schmelzflußindex von 6 bis 15 g/10 min gemäß ASTM D1238/73 (Bedingung L) aufweist.
4. Folie nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß basierend auf dem Gesamtgewicht der Mischung die Mischung zu 25 bis 75 Gew% aus dem ersten Polymer besteht.
5. Folie nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß die beschreibbare Schicht basierend auf dem Gewicht der Schicht bis zu 5 Gew% organischer oder anorganischer Füllpartikel enthält, die in ihr verteilt sind.
6. Folie nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß sie eine dritte Polymerschicht auf der Grundsicht besitzt.
7. Folie nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß sie auf der Grundsicht oder, falls vorhanden, auf der dritten Polymerschicht eine Klebeschicht oder einen Kaltkleber

aufweist.

8. Folie nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß sie als Verpackungsfolie ausgebildet ist.
9. Folie nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß sie als synthetisches Papier ausgebildet ist.

Revendications

1. Film polymère orienté comprenant une couche de base en polypropylène contenant des micro-pores et doté à sa surface d'une couche apte à recevoir des inscriptions, cette dernière comprenant un mélange d'un polyéthylène ayant un indice de fusion d'au plus 1 g/10 min. selon la norme ASTM D1238/73 (condition L) et d'au moins un polymère chimiquement incompatible contenant des motifs dérivés d'au moins l'un parmi l'éthylène, le propylène, et le 1-butylène et qui est autre qu'un homopolymère d'éthylène, ledit polymère incompatible présentant un indice de fusion de 4 à 50 g/10 min. selon la norme ASTM D1238/73 (condition L).
2. Film selon la revendication 1, dans lequel le polyéthylène présente une masse volumique de 0,920 g/cm³ à 0,970 g/cm³.
3. Film selon l'une quelconque des revendications précédentes, dans lequel le polymère chimiquement incompatible présente un indice de fusion de 6 à 15 g/10 min. selon la norme ASTM D1238/73 (condition L).
4. Film selon l'une quelconque des revendications précédentes, dans lequel le mélange comprend de 25 à 75 pour-cent en poids du premier polymère par rapport au poids total du mélange.
5. Film selon l'une quelconque des revendications précédentes, dans lequel la couche apte à recevoir des inscriptions comprend jusqu'à 5 pour-cent en poids de particules de charge inorganique ou organique dispersées en son sein, par rapport au poids de la couche.
6. Film selon l'une quelconque des revendications précédentes, comportant une troisième couche polymère sur la couche de base.
7. Film selon l'une quelconque des revendications précédentes, comportant une couche adhésive ou soudable à froid sur la couche de base ou sur la troisième couche polymère, éventuellement présente.

8. Film selon l'une quelconque des revendications précédentes, sous forme d'un film d'emballage.
9. Film selon l'une quelconque des revendications précédentes, sous forme d'un papier synthétique.

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